IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex Parte Joseph W. Harris

Appeal No. _____

Serial No.:	10/628,651
Filed:	July 28, 2003
Group Art Unit:	1793
Examiner:	Sikyin Ip
Applicant:	Harris et al.
Title:	**PHOSPHOROUS-COPPER BASE BRAZING ALLOY**
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REPLY BRIEF

This Reply Brief is in response to the Examiner's Answer mailed February 3, 2009.

III. Status of Claims

The correct status, as indicated by Examiner is: Claims 1, 5-7, 22, 25 and 35-44 are rejected. Claims 2-4, 8-21, 23-24 and 26-34 are canceled. Claims 1, 5-7, 22, 25 and 35-44 are currently pending and subject to this appeal.

VII. Argument

In the Response to Argument on Pages 8-9, Examiner provides a Table purported to be a summary of the alloy compositions in the independent claims and the cited references. The Table is a mischaracterization and is misleading. First, it gives no indication regarding the transition phrase used in the claims, namely "alloy consisting essentially of" for claims 1, 22 and 35, and "brazing component consists of" for claim 39. Second, it leaves out the proviso limitation regarding the sum of the Sn and Sb content recited in claims 35 and 39. Third, it omits additional elements in the alloy compositions of the prior art references, instead implying that Cu alone forms the balance of the composition. For example, the alloy of CN '052 (the CN Abstract) includes 0.02-0.2 % Zr and Ti, each, and 0.01-0.05 Ce; and the alloy of SU '816 includes 0.5-1.5% In. The brazing component of PL '319 (the PL Abstract) includes a carrier of methyl cellulose, glucose and water. Both the claims and the prior art must be considered as a whole, and this Table is an example of Examiners tendency to look at less than the whole in order to justify the rejections.

Numerous times throughout Examiner's Response, Examiner asserts that Appellant has shown that Alloys F, I, J and K are inoperable, referring to the First Affidavit of Robert Henson. This is simply untrue, and a complete mischaracterization of the evidence. The First Affidavit explains the attempt to braze using alloys A-K in powder form mixed in a carrier as taught by the PL Abstract. In other words, the PL Abstract teaches a brazing paste that includes the alloy powder in a carrier of methyl cellulose, glucose and water. When used in the carrier, brazing was unsuccessful, as explained in detail by Mr. Henson. Thus, the alloy compositions themselves were not addressed as operable or inoperable compositions, but rather, it was their use as a brazing paste, i.e. alloy powder dispersed in the Carrier taught by the PL Abstract to be a necessary component of their brazing paste, that was addressed. The alloy **paste** was inoperable regardless of which alloy composition was used.

In the Second Affidavit of Robert Henson, the Carrier was omitted, and the Alloys A-K were case in billets, extruded into rod or wire form, i.e., a claimed solid brazing component, and then a braze was attempted. In the Second Affidavit, Alloy K is provided as an exemplary alloy

of the invention of claims 35 and 39 that performs in a superior fashion to provide an excellent braze. Mr. Henson stated in the Second Affidavit:

> ***ALLOY – K (Alloy of Invention)***
>
> *T Joint – Good flow.*
>
> *Tube -- Good flow and capping ability.*
>
> *Bend Test – No cracks.*
>
> *Comments: Good temperature profile—narrow brazing temperature range and low liquidus temperature. Fast run speeds during extrusion and wire was not brittle. During braze tests, the alloy flowed well, formed good caps and smooth brazes, had good penetration, and the braze did not crack during the bend test. Capable of being commercially produced, and no evidence of likelihood of failure in service.*

For Alloys I and J, they did not fail, but were not considered ideal. Mr. Henson stated in the Second Affidavit:

> ***ALLOY – I (Alloy of Invention)***
>
> *T Joint – Good capillary flow.*
>
> *Tube – Good flow and cap.*
>
> *Return Bend – OK, good cap.*
>
> *Bend Test – Good, only small, slight crack.*
>
> *Comments: The liquidius temperature is a bit high due to the phosphorus content being at the lower end of the desired range, but a thermal arrest is observed. The alloy was able to be extruded into rod form with good flow properties and acceptable run speed, although the resulting rod/wire was brittle. Additional experimentation, including working the wire, may improve the ductility. The braze tests showed good braze performance, including good flow and cap formation. Only a slight, small crack was observed in the bend test. This alloy could potentially be used commercially, if the brittleness after extrusion can be improved, but the run speed may be limited to the lower end of speeds considered suitable for production.*
>
> ***ALLOY – J (Alloy of Invention)***
>
> *T Joint – Good capillary flow.*
>
> *Tube -- Good flow, slightly less capping ability due to higher phosphorus.*
>
> *Bend test – One crack.*

> *Comments: The brazing temperature range, although narrow, is on the high end for this alloy, demonstrating the effect of having phosphorus near the upper end of the claimed range, and tin at the lower end. An improvement in the temperature profile could be obtained by using 9% or less phosphorus and/or using more tin. The rod/wire was also very brittle after extrusion, although a high run speed was possible. During braze testing, the alloy flowed well, but the high phosphorus content limits the capping ability and contributed to a crack forming during the bend test. Again, an improvement would be expected with a lower phosphorus content.*

Thus, the repeated statement by Examiner that Alloys I, J, and K are inoperable embodiments within the claimed ranges is absolutely incorrect and a complete mischaracterization of the evidence presented. Alloy F was considered a failure, due to the high combined content of Sn and Sb.

Regarding Examiner's Response at Page 10, Examiner alleges that because the claims don't recite the property that the alloy flows, that such property is irrelevant. Appellant is claiming a brazing component, and by such claimed term, which is a well-known technical term in the art, the component must be suitable for use in forming a brazed joint, i.e., useful as a brazing alloy. The ability of a brazing alloy to melt and flow into the joint is essential for its suitability as a brazing alloy, and cannot possibly and/or rationally be considered irrelevant. While Appellant would certainly be willing to add language into the claim regarding the ability of the alloy to melt and flow, it seems unnecessary in view that such ability must be inherent for a "brazing" alloy/component. So, the fact that the only example of a specific alloy provided in the PL Abstract does not flow at the melt temperature is proof that the reference is not enabling one skilled in the art to formulate an alloy that is operable for use as a brazing alloy.

Examiner goes on to say that because a few tests (Alloys F, I, J and K) have been provided within Appellant's claimed ranges that fail, the claimed alloy compositions are no better than the prior art alloys. First, as explained above, Alloy K did not fail, but rather, was provided as an exemplary composition for claims 35 and 39 that performs in a superior fashion to provide an excellent braze. Thus, Examiner is mischaracterizing the evidence. Second, Alloy F does fall within claims 1and 22 but falls just outside claims 35 and 39. Alloy F is provided as an example of the effect of too much Sn and Sb, combined, i.e., the alloy demonstrates the

criticality of the proviso limitation. It bears mentioning that claims of different scope are quite acceptable, and evidence that pertains to an element in one or more claims that is not present in one or more other claims is perfectly acceptable and of value for those claims to which it pertains. It also bears mentioning that every possible combination with the claimed ranges need not be operable, provided that adequate teaching is provided to one of skill in the art as to how to choose operative from inoperative embodiments encompassed by the claims without undue experimentation. See *Atlas Powder Company vs. E.I. Du Pont de Nemours & Co.*, 750 F.2d 1569, 224 USPQ 409 (Fed. Cir. 1984). Appellant has given ample explanation of the factors that go into selection of an operable alloy from within the claimed ranges and provided a significant number of operable alloys within the claimed ranges, and thus has provided sufficient information for one skilled in the art to select operable alloys from the claims. The PL Abstract, on the other hand, provides a broad range and a single inoperable embodiment with no explanation to one skilled in the art on how to select any operable compositions from within its broad teachings. Attempting to follow the PL Abstract, as Mr. Henson did as set forth in his First Affidavit, results in failure of all attempts to form a brazed joint as a result of the Carrier. Attempts to braze the single disclosed example (Alloy A) of the PL Abstract without the Carrier, as set forth in the Second Affidavit, also failed to produce a viable braze.

In addition, Examiner asserts that Alloys I and J fail. According to the Second Affidavit, the alloys did not fail, but were not ideal, the reason being that two of the components were at the end points of their ranges and that adjusting one or both of those components would result in improvement. So again, Examiner mischaracterizes the evidence. Finally, Examiner comments that the Alloys I and J fail to show ranges from end-point to end-point because appellant failed to keep other elements' contents constant. Examiner fails to appreciate that this is a multi-component alloy where elements act in synergistic relation. I and J show the effect of providing P near the lower limit with Sn at the upper limit, and vice-versa. Every other element was held constant. With 2 of the elements at their endpoints, a less than ideal result is obtained. In other words, there is no single critical element. Each element has a critical range and all elements act together with synergy to produce a result that is either acceptable or not acceptable. Appellant

has given significant guidance in that regard in the specification and in the evidence provided to date. If there is something more required, Appellant is willing to provide it, if only it were clear what exactly the Office expects. Instead, Examiner merely disregards every piece of evidence offered, and fails to examine the evidence as a whole for what it does prove. Examiner even says that no test is done just outside the claimed end-points. What about Alloys B-E and G-H2? Again, evidence is being flat-out ignored.

Examiner states on page 12 that Appellant has not shown why the Alloys F and I-K would have different liquidus temperatures. Obviously, it is because they have different compositions. This is a basic metallurgical concept. While each of those compositions fall within the scope of either claim 1 or claims 35 and 39, they are different and thus exhibit a different temperature profile, some of which fall within the more narrow scope of claim 5 and some of which don't. The fact that Examiner does not seem to understand this basic concept of alloys must call into question the ability of the Examiner to understand the subject matter of this invention.

On page 13, Examiner asserts that prior art Alloy F anticipates claims 1 and 22. First, Alloy F was provided by Appellant as a test composition to illustrate the effect of exceeding the proviso limitation in claims 35 and 39. While Alloy F does fall within the scope of claims 1 and 22, this specific composition is not explicitly found in the prior art. Rather, this composition falls within the broad range of the PL Abstract, but there is no teaching or suggestion of the critical ranges claimed.

On Page 13, Examiner states that "According to First Affidavit by Mr. Henson that alloys A-K in said Table fall outside the claimed liquidus temperature . . . ." NO, NO, NO!!! No such thing was ever said! Again, Examiner is totally and egregiously mischaracterizing the evidence. All the alloys in Table 1 (page 61 of Brief) and Table A (page 176 of Brief) have a liquidus above 840°F, as claimed, but not all are suitable as a commercial brazing alloy as explained by Mr. Henson. For example, certain alloys don't flow into the joint, others are too brittle and crack, others hot short, etc. Note that Table A includes the additional alloys that were provided

in the specification, in addition to the Alloys A-K that were provided in Table 1 during prosecution.

Regarding Examiner comment at the bottom of Page 13, Alloys I, J and K do not fall within the scope of claims 1 or **22** due to the lack of Ni. That Ag is optional in claim 22 is therefore irrelevant, as those alloys are evidence directed to claims 35 and 39. Further Examiner's assertion that alloys I, J and K all failed is a mischaracterization of the evidence, as explained above. In particular, Alloy K is exemplary. Alloys I and J were not ideal but were not characterized as failures.

On Pages 17 and 20 of Examiner's Response for claims 5, 36 and 40, Examiner has completely mischaracterized the evidence with respect to the liquidus temperature. First, in the First Affidavit, where Mr. Henson tested the brazing pastes of the PL Abstract, he could not get a braze to form at temperature below or above 1292°F, which is the temperature below which the PL Abstract states its brazing paste may be used. The First Affidavit therefore does not show that the alloys of the PL Abstract or the alloys I, J and K have a liquidus temperature of about 1292°F as the Examiner asserts. Table 1 was provided with Mr. Henson's Second Affidavit, in which he provided the liquidus and solidus temperatures of Alloys A-K. Some of those alloys have a liquidus and solidus within the claimed ranges, some don't. Clearly, Alloys I-J don't have a liquidus of 1292°F as Examiner asserts, and it is a mischaracterization of the Evidence for Examiner to state that Appellant has shown that. Appellant has provided many examples, 40 to be exact, set forth in Table A on page 176 of Brief, some of which fall outside the claimed invention and some of which fall within the claimed invention, and some of which have the claimed solidus and liquidus temperatures, and some of which don't. This is believed to be ample evidence that the prior art does not inherently teach this limitation. In addition, Examiner refers to "flow" of the molten alloys and First Affidavit (Item 3). It is believe that Examiner means to refer to Mr. Henson's Third Affidavit, Item 3. In any event, the claims recite specific solidus and liquidus temperature that are not inherently present across the range of alloys disclosed in the prior art, and Appellant has provided ample evidence of the criticality of composition on the temperature profile of these brazing alloys.

On Pages 18 and 20 of Examiner's Response for claims 7, 38 and 42, Examiner asserts that "appellant has not shown the thermal arrest temperature is not inherently possessed by alloys of cited references." Appellant has provided many examples, 40 to be exact, set forth in Table A on page 176 of Brief, some of which fall outside the claimed invention and some of which fall within the claimed invention, and some of which have no major thermal arrest, and some of which do. Of those that do, only some have a thermal arrest that meets the claimed limitation, i.e., less than about 1250°F (claim 7) or less than about 1275°F (claims 38 and 42). Are these 40 compositional examples not proof of the non-inherency of a major thermal arrest of less than about 1250°F or 1275°F?

On Pages 18, 19 and 20 of Examiner's Response for claim 43, 44, 35, 41, 36, 40, 37, 38, 42 and 39, Examiner asserts that Alloys I, J and K are inoperable and so there is no showing that the proviso is critical or possesses unexpected result. As explained above, those Alloys are not inoperable and the evidence does show criticality/unexpected result. Examiner has disregarded this limitation and the evidence in supports of its criticality.

On Page 20 of Examiner's Response for claim 39, "solid brazing component consists of" does exclude the carrier of the PL reference. Furthermore, the evidence presented has proven that the powder compositions of the PL Abstract do not necessarily form viable brazes with or without the carrier. Moreover, Appellant claims solid components that do not include the powder form, as a powder is considered to be a loose particulate form not ideal for the applications of the brazing components of the invention.

A Request for Oral Hearing is submitted concurrently herewith.

Respectfully Submitted,

WOOD, HERRON & EVANS, L.L.P.

By /Kristi L. Davidson/
Kristi L. Davidson, Reg., No. 44,643

2700 Carew Tower, 441 Vine Street
Cincinnati, OH 45202-2917
Voice: (513) 241-2324
Facsimile: (513) 241-6234
kdavidson@whepatent.com
892211v1